

1 What is claimed is:

2
3 1. An encoding system for determining position and position changes of
4 a moving member, comprising:

5 a sequence of encoder marks forming incremental patterns and at least
6 one index pattern, wherein two subsequent incremental patterns are indica-
7 tive of an incremental position-change of the moving member and the index
8 pattern is indicative of a reference position of the moving member;

9 a sensor arrangement viewing a section of the encoder-mark sequence,
10 the length of which is greater than one position-change increment;

11 an analyzer arranged to analyze an encoder-mark pattern in the viewed
12 section with regard to the incremental patterns and the index pattern and to
13 generate, in response to a pattern match found, at least one of an incre-
14 mental-position-change signal and an index signal.

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16 2. The encoding system of claim 1, wherein the sensor arrangement
17 comprises a plurality of sensor elements arranged to simultaneously detect a
18 plurality of encoder marks in the section of the encoder-mark sequence.

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20 3. The encoding system of claim 1, wherein the index pattern has a
21 length, and the length of the viewed section corresponds to the length of the
22 index pattern.

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24 4. The encoding system of claim 1, wherein subsequent incremental
25 patterns overlap.

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27 5. The encoding system of claim 1, wherein the encoder marks are iden-
28 tical.

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30 6. The encoding system of claim 1, wherein the system is a linear or an
31 angular encoding system.

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1 7. An encoding system for determining position and position changes of
2 a moving member, comprising:

3 a row of encoder marks arranged along the moving member in a gener-
4 ally regular manner to provide incremental position-change information;

5 at least one index marking in the form of a predefined pattern of encoder
6 marks which represents a disturbance of the regular encoder-mark arrange-
7 ment;

8 a sensor arrangement viewing a section of the row of encoder marks
9 and arranged to provide a viewed pattern of the encoder-mark section;

10 an analyzer arranged to analyze the viewed pattern to generate incre-
11 mental-position-change signals on the basis of the encoder marks and an
12 index signal in response to a detection of the predefined index mark pattern,

13 wherein the incremental-position-change signals are enabled to be gen-
14 erated also in that section of the encoder-mark row in which the regular en-
15 coder-mark arrangement is disturbed by the index marking.

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17 8. The encoding system of claim 7, wherein the sensor arrangement
18 comprises a plurality of sensor elements arranged to simultaneously detect a
19 plurality of encoder marks in the viewed encoder-mark section.

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21 9. The encoding system of claim 7, wherein the index marking has a
22 length, and the length of the viewed encoder-mark section corresponds to the
23 length of the index marking.

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25 10. The encoding system of claim 7, wherein the sensor arrangement is
26 arranged to detect, in the viewed section, a multiplicity of encoder marks, so
27 that the detected encoder marks carry redundant incremental position-change
28 information at least in regions of regular encoder-mark arrangement, wherein
29 the detection of the multiplicity of encoder marks enables the incremental-
30 position-change signals to be generated also in that section of the encoder-
31 mark row in which the regular encoder-mark arrangement is disturbed by the
32 index marking.

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1 11. The encoding system of claim 7, wherein the encoder marks are
2 equidistantly spaced in regions of regular encoder-mark arrangement.

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4 12. The encoding system of claim 7, wherein the encoder marks are
5 identical.

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7 13. The encoding system of claim 1, wherein the system is a linear or an
8 angular encoding system.

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10 14. An encoding system for determining position and position changes
11 of a moving member, comprising:

12 a row of identical encoder marks forming incremental patterns and at
13 least one index pattern, wherein two subsequent incremental patterns are
14 indicative of an incremental position-change of the moving member and the
15 index pattern is indicative of a reference position of the moving member;

16 a sensor arrangement detecting a pattern of a section of the encoder-
17 mark row;

18 an analyzer arranged to analyze the detected encoder-mark pattern with
19 regard to the incremental patterns and the index pattern and to generate, in
20 response to an incremental-pattern match found, an incremental-position-
21 change signal and, in response to an index-pattern match found, an index
22 signal.

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24 15. The encoding system of claim 14, wherein the sensor arrangement
25 comprises a plurality of sensor elements arranged to simultaneously detect a
26 plurality of encoder marks in the section of the encoder-mark row.

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28 16. The encoding system of claim 14, wherein the index pattern has a
29 length, and the length of the viewed section corresponds to the length of the
30 index pattern.

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1 17. The encoding system of claim 14, wherein the sensor arrangement
2 comprises a sensor element arranged to successively detect the encoder
3 marks or groups of the encoder marks in the section of the encoder-mark row
4 upon the movement of the moving member, wherein the encoding system is
5 arranged to combine the successively detected encoder marks to form the
6 detected encoder-mark pattern.

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8 18. The encoding system of claim 14, wherein subsequent incremental
9 patterns overlap.

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11 19. The encoding system of claim 14, wherein the system is a linear or
12 an angular encoding system.

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14 20. A printing device having an encoding system for determining position
15 and position changes of a recording medium conveyor to determine the posi-
16 tion of a recording medium placed on the conveyor, comprising:

17 a sequence of encoder marks forming incremental patterns and at least
18 one index pattern, wherein two subsequent incremental patterns are indica-
19 tive of an incremental position-change of the conveyor and the index pattern
20 is indicative of a reference position of the conveyor;

21 a sensor arrangement viewing a section of the encoder-mark sequence,
22 the length of which is greater than one position-change increment;

23 an analyzer arranged to analyze an encoder-mark pattern in the viewed
24 section with regard to the incremental patterns and the index pattern and to
25 generate, in response to a pattern match found, at least one of an incre-
26 mental-position-change signal and an index signal.

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28 21. The printing device of claim 20, wherein the recording medium con-
29 veyor is a belt conveyor.

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31 22. The printing device of claim 20, wherein the encoder-mark sequence
32 is an encoder-mark row arranged along the recording medium conveyor.

1 23. The printing device of claim 20, wherein the printing device has a
2 plurality of print stations arranged along the recording medium conveyor, and
3 each print station is individually equipped with said sensor arrangement and
4 analyzer.

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6 24. The printing device of claim 20, wherein the printing device is a
7 page-wide ink-jet printer.

8
9 25. A printing device having an encoding system for determining position
10 and position changes of a recording medium conveyor to determine the posi-
11 tion of a recording medium placed on the conveyor, comprising:

12 a row of encoder marks arranged along the conveyor in a generally
13 regular manner to provide incremental position-change information;

14 at least one index marking in the form of a predefined pattern of encoder
15 marks which represents a disturbance of the regular encoder-mark arrange-
16 ment;

17 a sensor arrangement viewing a section of the row of encoder marks
18 and arranged to provide a viewed pattern of the encoder-mark section;

19 an analyzer arranged to analyze the viewed pattern to generate incre-
20 mental-position-change signals on the basis of the encoder marks and an
21 index signal in response to a detection of the predefined index mark pattern,

22 wherein the incremental-position-change signals are enabled to be gen-
23 erated also in that section of the encoder-mark row in which the regular en-
24 coder-mark arrangement is disturbed by the index marking.

25
26 26. The printing device of claim 25, wherein the recording medium con-
27 veyor is a belt conveyor.

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29 27.. The printing device of claim 25, wherein the printing device has a
30 plurality of print stations arranged along the recording medium conveyor, and
31 each print station is individually equipped with said sensor arrangement and
32 analyzer.

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1 28. The printing device of claim 25, wherein the printing device is a
2 page-wide ink-jet printer.

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4 29. A printing device having an encoding system for determining position
5 and position changes of a recording medium conveyor to determine the posi-
6 tion of a recording medium placed on the conveyor, comprising:

7 a row of identical encoder marks forming incremental patterns and at
8 least one index pattern, wherein two subsequent incremental patterns are
9 indicative of an incremental position-change of the conveyor and the index
10 pattern is indicative of a reference position of the conveyor;

11 a sensor arrangement detecting a pattern of a section of the encoder-
12 mark row;

13 an analyzer arranged to analyze the detected encoder-mark pattern with
14 regard to the incremental patterns and the index pattern and to generate, in
15 response to an incremental-pattern match found, an incremental-position-
16 change signal and, in response to an index-pattern match found, an index
17 signal.

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19 30. The printing device of claim 29, wherein the recording medium con-
20 veyor is a belt conveyor.

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22 31. The printing device of claim 30, wherein the encoder-mark row is ar-
23 ranged along the recording medium conveyor.

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25 32. The printing device of claim 30, wherein the printing device has a
26 plurality of print stations arranged along the recording medium conveyor, and
27 each print station is individually equipped with said sensor arrangement and
28 analyzer.

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30 33. The printing device of claim 30, wherein the printing device is a
31 page-wide ink-jet printer.

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1 34. A method of determining position and position changes of a moving
2 member using a sequence of encoder marks which forms incremental pat-
3 terns and at least one index pattern, wherein two subsequent incremental
4 patterns are indicative of an incremental position-change of the moving mem-
5 ber and the index pattern is indicative of a reference position of the moving
6 member, comprising the steps:

7 viewing a section of the encoder-mark sequence, the length of which is
8 greater than one position-change increment;

9 analyzing a encoder-mark pattern in the viewed section with regard to
10 the incremental patterns and the index pattern; and

11 generating, in response to a pattern match found, at least one of an
12 incremental-position-change signal and an index signal.

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14 35. A method of determining position and position changes of a moving
15 member using a row of encoder marks arranged along the moving member in
16 a generally regular manner to provide incremental position-change informa-
17 tion; at least one index marking in the form of a predefined pattern of encoder
18 marks which represents a disturbance of the regular encoder-mark arrange-
19 ment, comprising the steps:

20 viewing a section of the row of encoder marks;

21 providing a viewed pattern of the encoder-mark section;

22 analyzing the viewed pattern to generate incremental-position-change
23 signals providing the incremental position-change information on the basis of
24 the encoder marks and an index signal in response to a detection of the pre-
25 defined index mark pattern,

26 wherein the incremental-position-change signals are enabled to be gen-
27 erated also in that section of the encoder-mark row in which the regular en-
28 coder-mark arrangement is disturbed by the index marking.